

**67635**

*DRAFT*

Ferroan Anorthosite

9.12 grams



Figure 1: Photo of 67635. Scale in mm. S72-49561.

## **Introduction**

67635 was collected as a rake sample from the SE rim of North Ray Crater in the vicinity of the White Breccia Boulders (67415 etc)(Sutton et al. 1981). It is a relatively unshocked ferroan anorthosite, but it has not been dated. Smaller samples 67636 and 67637 appear similar.

## **Petrography**

67635 is an angular, chalky white, very homogeneous sample with very finely granular sugary texture. It has very tiny opaque flakes disseminated throughout. Part of the surface has micrometeorite craters with brown transparent glass linings.

Warren and Wasson (1980) reported that 67635 is a “monomict breccia, perhaps lightly less cataclastic than typical ferroan anorthosite”.

## **Mineralogical Mode for 67635**

Olivine + Pyroxene	12.4 %
Plagioclase	87.4
Opalines	0.1

## **Mineralogy**

The composition of pyroxene and olivine has been reported in Bersch et al. (1991) and Warren and Wasson (1980). Trace elements were reported by Smith et al. (1980).

Plagioclase: Plagioclase ( $An_{95}$ ) in 67935 is up to 3 mm in size. Trace elements in plagioclase were reported by Steele et al. (1980).

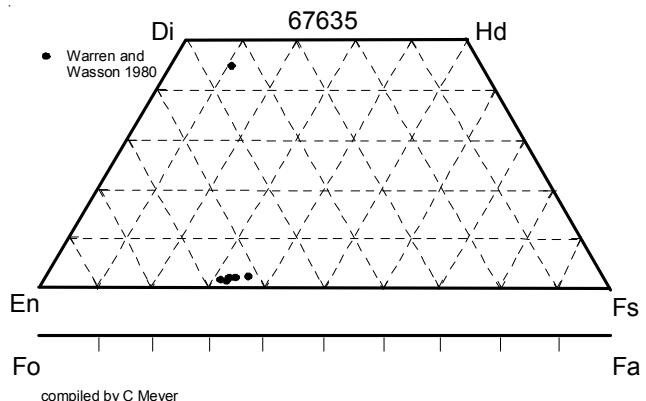


Figure 2: Pyroxene composition of 67635 (from Warren and Wasson 1980).

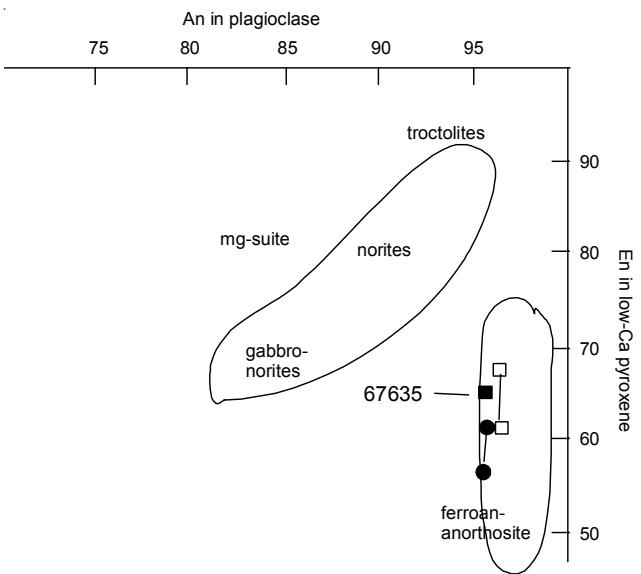


Figure 3: Plagioclase and pyroxene composition of 67635 showing that 67635, 67636 and 67637 are ferroan anorthosites.

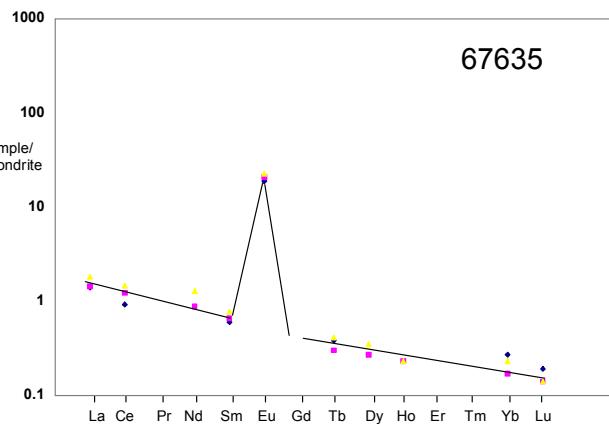


Figure 4: Normalized rare-earth-element diagram for 67635 (data from Warren and Wasson 1980 and Palme et al. 1984).

## Chemistry

Palme et al. (1984) and Warren and Wasson (1980) have analyzed 67635 (table 1 and figure 4) and the REE pattern is illustrated in Stoffler et al. (1984). The Ir and Au content is low and it is considered a chemically “pristine” sample of the early lunar crust.

## Radiogenic age dating

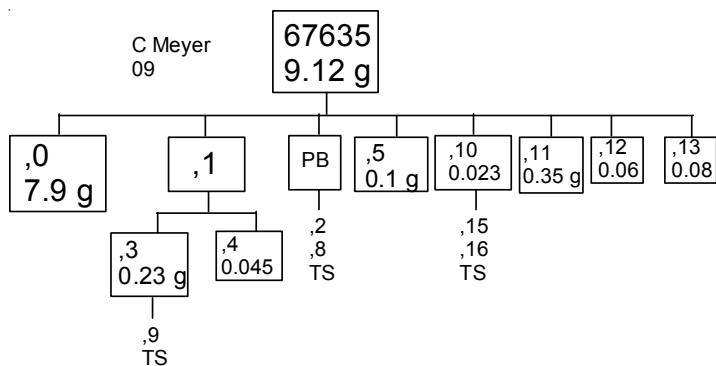
None reported

## Other Studies

The samples of North Ray Crater were the subject of a consortium led by Dieter Stoffler.

## Processing

There are 5 thin sections of 67635.



**Table 1. Chemical composition of 67635.**

reference	Warren80	Palme84	plagioclase							
<i>weight</i>										
SiO <sub>2</sub> %	44.93	(a)								
TiO <sub>2</sub>	0.01	(a)								
Al <sub>2</sub> O <sub>3</sub>	34.77	(a)								
FeO	0.26	(a)	0.14	0.2	(a)	0.11	0.16	0.21	4	2.5
MnO	0.006	(a)	0.004	0.005	(a)					
MgO	0.16	(a)								
CaO	18.9	(a)	16.8	18.8	(a)					
Na <sub>2</sub> O	0.62	(a)	0.52	0.58	(a)		0.58	0.55		
K <sub>2</sub> O	0.02	(a)	0.018	0.023	(a)					
P <sub>2</sub> O <sub>5</sub>										
S %										
<i>sum</i>										
Sc ppm	0.34	(a)	0.24	0.34	(a)	0.276	0.25	0.203	3.7	2.7
V										
Cr	15.2	(a)	6.2	8.4	(a)					
Co	1.5	(a)	0.07	0.17	(a)					
Ni	1.2	(a)								
Cu										
Zn	0.74	(a)		1.3	(a)					
Ga	5.2	(a)	4.28	5.2	(a)					
Ge ppb	2.6	(a)								
As										
Se										
Rb				0.79	(a)					
Sr	167		215	229	(a)	221	234	260		236
Y										
Zr	27	(a)	60	52	(a)					
Nb										
Mo										
Ru										
Rh										
Pd ppb										
Ag ppb										
Cd ppb	1.8	(a)								
In ppb	0.4	(a)								
Sn ppb										
Sb ppb										
Te ppb										
Cs ppm										
Ba	18	(a)		21.7	(a)	21	23	20		21
La	0.33	(a)	0.34	0.425	(a)	0.355	0.4	0.425		0.4
Ce	0.56	(a)	0.74	0.88	(a)					
Pr										
Nd	1.3	(a)	0.4	0.58	(a)					
Sm	0.089	(a)	0.097	0.114	(a)					
Eu	1.05	(a)	1.16	1.27	(a)	1.21	1.34	1.33	1.3	1.31
Gd										
Tb	0.014	(a)	0.011	0.015	(a)					
Dy			0.066	0.085	(a)					
Ho			0.013							
Er										
Tm										
Yb	0.044	(a)	0.028	0.038	(a)	0.0029	0.0025	0.009	0.034	0.012
Lu	0.0047	(a)	0.0035	0.0035	(a)	0.0026	0.0002			0.002
Hf	0.08	(a)	0.015	0.02	(a)					
Ta	0.07	(a)		0.01	(a)					
W ppb										
Re ppb	0.007	(a)								
Os ppb										
Ir ppb	0.027	(a)	1	1	(a)					
Pt ppb										
Au ppb	0.024	(a)								
Th ppm	0.06	(a)								
U ppm	0.1	(a)								
<i>technique:</i>	(a) INAA									

## References for 67635

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